

OPTICAL ISOLATOR REDUCES NOISE IN FIBER OPTICS

The booming telecommunications market heavily supports fiber-optic technologies, leading to increased development of optical switching, multiplexing, and long-line transmission of the optical signals. Contributing to this technological advancement, E-TEK Dynamics, Inc. (San Jose, CA), developed a new fiber-optic device that reduces the electronic-to-optics transitions in the network.

E-TEK's device, called the polarization insensitive fiber isolator (PIFI), eliminates unwanted light reflections in fiber-optic cables. These reflections cause noise, which greatly reduces signal quality. The BMDO SBIR program funded the development of the PIFI for a fiber-optic sensor system to track ballistic missiles. The technology is now finding a role in new fiber-optic systems.

For example, the PIFI is an essential component in advanced fiber-optic communications components, such as the erbium-doped fiber amplifier (EDFA). EDFAs are increasingly replacing repeaters to amplify lightwave signals in long-distance fiber-optic telecommunications (including transoceanic), cable television distribution, and long-distance soliton (isolated wave) transmission. Unlike repeaters, EDFAs do not convert an optical signal into an electric signal to boost it, resulting in lower operating costs, better transmission quality, and more compact systems.

E-TEK supplies PIFIs to all of the major EDFA manufacturers that provide optical amplifiers to such telecommunications giants as AT&T, Sprint, MCI, and British Telecommunications. One of E-TEK's main product lines, the PIFI accounts for nearly 50 percent of the company's revenue. According to J.J. Pan, E-TEK's chairman and chief scientist, the company employed about 40 people and had an annual revenue of \$1 million when it began the transition to volume production of the isolators in 1990. Today, the company employs 250 people and has annual sales of over \$40 million.

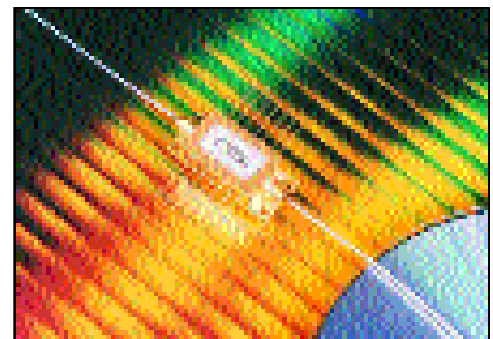
The hermetically sealed semiconductor optical amplifier, another E-TEK product, also stems from BMDO-funded research. This device uses a diode laser and a temperature stabilizer to provide low-power optical amplification. Sold primarily for laboratory research, it may also be useful for small fiber-optic networks because of its compact packaging and lower cost than EDFAs.

ABOUT THE TECHNOLOGY

Fiber isolators prevent one system from disturbing another while transmitting signals between them. E-TEK's PIFI minimizes back-scattering and back-reflection of optical signals, thus maintaining a high signal-to-noise ratio. Mismatching polarization in fiber-optic components causes high insertion loss, so polarization-insensitive fiber isolators are key to amplifier performance. The highly reliable PIFI Classic features 40 decibel (dB) of isolation, with a 0.3 dB insertion loss and 0.2 picosecond polarization mode dispersion. The multistage PIFI Ultimate has 70 dB of isolation, with 0.7 dB insertion loss and 0.5 picosecond polarization mode dispersion.

. . . an isolator that improves the way optical amplifiers manipulate light to enhance signal quality in fiber optics.

E-TEK'S FIBER-OPTIC TECHNOLOGY IS BEING USED BY SUCH TELECOMMUNICATIONS GIANTS AS AT&T, SPRINT, AND MCI.



■ E-TEK's optical amplifier, pictured above, may be ideal for small fiber-optic networks because of its compact packaging and low cost.